GUIDANCE FOR FOODS EXPOSED TO AMMONIA LEAKS IN COLD STORAGE FACILITIES

Worker Health and Safety – First and foremost, managers and supervisors must **ensure the safety of employees** following an ammonia leak. Employees should be evacuated from the immediate area until an assessment by trained hazardous material responders determines that it is safe to allow employees to return to the area. Ammonia [NH_3] has significant toxicity at reasonably low levels. Children, pregnant women, and nursing mothers are likely to be especially sensitive. Symptoms indicative of ammonia toxicity include nausea, vomiting, dizziness and/or difficulty breathing, mucous membrane irritation. Anyone experiencing any of these symptoms following an ammonia leak should seek immediate medical attention. NIOSH and OSHA have established that ammonia levels may not exceed 50 ppm during an 8 hour workplace period, and EPA has established recommended criteria for risk management of ammonia. For specific information dealing with worker health and safety issues in ammonia leaks, see the attached references.

Illnesses and Outbreaks Related to Ammonia in Foods - Illnesses associated with ammonia-contaminated foods have been reported. In Wisconsin, [*MMWR v.35,* p. 274-5, (May, 1986)], at least 520 cartons of ammonia-contaminated milk were ingested, causing 20 children to experience nausea, stomachache, and sore mouth and throat. This milk was determined to have from 530 to ~1,520 ppm of ammonia contamination. In Illinois, 157 students and teachers became ill, with 42 children and 2 adults being sent to emergency rooms via 18 ambulances due to ammonia exposure from contaminated chicken tenders in a school lunch program. Ammonia levels in these chicken tenders were estimated at 552 to 2468 ppm while uncooked [still frozen] and 880 to 1076 ppm in unserved heated chicken pieces. [*J Food Protection, v.67*, p. 1299-1302. (June, 2004)]

Assessing the Safety of Foods Exposed to Ammonia – Firms experiencing an ammonia leak in a cold storage warehouse should contact the California Department of Health Services - Food and Drug Branch (FDB) after the safety of the employees has been established (see contact number below). Occasionally, firms experiencing an ammonia leak may wish to attempt to salvage or recondition foods exposed to ammonia instead of destroying and disposing of the exposed food. While there are no current regulatory limits for the amount of ammonia in foods, the FDB strongly suggests that firms use caution in any attempt to salvage or recondition these foods. The responsibility for ensuring the safety of the food rests with the owner of the food. FDB offers the following guidance for firms that wish to assess the safety of foods exposed to ammonia for the purpose of salvaging or reconditioning.

- Firms should develop a written proposal for evaluation of salvaging or reconditioning foods exposed to ammonia. The proposal will be evaluated by FDB staff and should include:
    - A thorough description of the event with times, dates, amounts and types of foods by size and packaging, and any measured levels of ammonia to date.
    - A detailed sampling and testing plan for all foods exposed to the ammonia, and identification of an experienced food laboratory that will conduct product analysis. This plan should include sufficient sample sizes for each product type and packaging to allow for a reasonable degree of comfort with the analytical findings. The plan should also include sufficient testing of similar non ammonia-exposed foods to determine “normal” or “background” levels in these food products. Although there are no strict requirements for the tests to be conducted, the plan should, at a minimum, include ammoniacal nitrogen testing and may include all three assessments described in the paper by Goodfellow referenced below (an organoleptic evaluation, a pH assessment, and ammoniacal nitrogen testing).

FDB will evaluate the plan and provide feedback on any changes needed. Any plan subsequently approved by FDB would require strict oversight and control of all exposed foods at all times by the firm. It is likely that an embargo will be placed on all exposed foods until a decision is reached on the appropriate disposition or handling of these foods. Once an embargo is placed, no exposed foods can be removed from the facility without approval by FDB. Violation of an embargo can result in civil or criminal penalties.

California Department of Health Services – Food and Drug Branch contact information

916-650-6500

LIST OF AMMONIA REFERENCES

NIOSH Pocket Guide for Ammonia: http://www.cdc.gov/niosh/npg/npgd0028.html [listing **OSHA PEL mandated limit**: TWA 50 ppm (35 mg/m^3)] .

OSHA'sNH_3Refrigeration–Safety-HealthTopics**:**
http://www.osha.gov/SLTC/etools/ammonia_refrigeration/index.html

OSHA's Ammonia Refrigeration e-Tool: http://www.osha.gov/SLTC/etools/ammonia_refrigeration/index.html

NH_3-Release/Hazards-[EPA]
http://yosemite.epa.gov/oswer/ceppoweb.nsf/vwResourcesByFilename/ammonia.pdf/$file/ammonia.pdf?OpenElement

EPA Ammonia Management pdf file: http://www.epa.gov/ttn/oarpg/t3/memoranda/ammon.pdf

EPA NH_3 Management Program; http://www.epa.gov/swercepp/pubs/plan/ammonia/brochure.htm

Goodfellow, S.J., Assuring Quality After Ammonia Leaks, Food Product Development, October 1978, p. 32.

Smith, M.A., Ammonia Spills and the Effect of Ammonia on Products Stored in Refrigerated Warehouses – Project #87-3, August 1987, Sponsored by The Refrigeration Research Foundation.